

### **REMARKS**

This Amendment is in response to the Office Action mailed . In the Office Action, the Examiner rejected claims 6-8 and 17-21 under 35 U.S.C. § 101, rejected claims 1-24 under 35 U.S.C. § 112, rejected claims 1, 12 and 17 under 35 U.S.C. § 102, and rejected claims 2, 8, 9, 13, 18 and 22 under 35 U.S.C. § 103. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

#### ***Rejection Under 35 U.S.C. § 101***

3. The Examiner rejects claims 6-8 and 17-21 under 35 U.S.C. § 101 asserting that the claimed invention is directed to non-statutory subject matter, since the claimed invention lacks patentable utility.
4. **Claims 6-8** are rejected under 35 U.S.C. 101 because the Examiner asserts that the claimed invention is directed to non-statutory subject matter. The Examiner states that the current focus of the Patent Office in regard to statutory inventions under 35 U.S.C. § 101 for method claims and claims that recite a judicial exception (software) is that the claimed invention recite a practical application. Practical application can be provided by a physical transformation or a useful, concrete and tangible result.

Applicant respectfully points out that the Federal Circuit has recently decided the case of *In re Bilski*, 545 F.3d 943, 88 U.S.P.Q.2d 1385 (2008) and rejected the useful, concrete and tangible result test it had previously adopted in *State Street Bank and Trust Co. v. Signature Financial Group*, 149 F.3d 1368 (Fed. Cir. 1998). Applicant has amended claim 6 to tie the method to a processor that hosts a guest virtual machine. As the court stated in *Bilski*, “A claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus...”

Applicant respectfully requests that the Examiner withdraw the rejection of claims 6-8 under 35 U.S.C. § 101 as lacking patentable utility.

5. **Claims 17-21** are rejected under 35 U.S.C. 101 because the Examiner asserts that the claimed invention is directed to non-statutory subject matter. The Examiner asserts that the claims are directed to a signal directly or indirectly by claiming a medium and the Specification recites evidence where the computer readable medium is define as a "wave" (such as a carrier wave). In that event, the claims are directed to a form of energy which at present the office feels does not fall into a category of invention.

Applicant has amended paragraph [0030] to delete the portions stating that the medium includes mechanisms for transmitting information such as carrier waves.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 17-21 under 35 U.S.C. § 101 as lacking patentable utility.

***Rejection Under 35 U.S.C. § 112***

7. Claims 1-24 are rejected by the Examiner under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A. The Examiner asserts that the following claims lack antecedent basis:

i ) Claim 7, line 3, "the guest virtual machine".

Applicant has amended claim 6 to provide antecedent basis for "the guest virtual machine".

B. The Examiner asserts that the following claim languages are unclear and indefinite:

i) Claim 1, line 2, it is uncertain what a control flag is <i.e. what does it do? Can it be a message? A pointer to a thread? What is it?>.

Line 6, it is unclear where the "shadow location" is <i.e. is it part of the guest virtual machine?>.

Claims 6, 12, 17 have the same deficiencies as claim 1 above.

Applicant has amended claims 1, 6, 12, and 17 to recite that the control flag is included in the processor's processor control register to clarify what a control flag is. Applicant is further amended these claims to recite that the shadow location is in a guest virtual machine context in a memory coupled to the processor.

ii) Claim 5, while it mentioned "a second flag", it is uncertain where in the previous claims had mentioned "a first flag"<i.e. although a first flag is mentioned in claim 2, claim 5 does not depend on claim 2.>

Claims 16 and 21 have the same deficiencies as claims 5 above.

Applicant has amended claims 5, 16, and 21 to delete --second--.

iii) Claim 9, the Examiner asserts that it is uncertain what the difference is between "a shadow location" and a guest virtual machine i.e. if the shadow location is in the guest virtual machine, then the writing of the control flag will always go to the virtual machine regardless of whether the flag is owned by the guest virtual machine or not. Are there two separate memory locations within the guest VM such that the flag is written to one of them, which is the shadow

location, if the flag is not owned by the VM, and to a second location if it is owned by the VM? However, as one can see, the flag will always go to the VM regardless of the ownership. The claim is confusing and unclear.>

Applicant respectfully disagrees that the claim is unclear. The claim recites a processor that includes a processor control register that includes a control flag. Therefore the control flag is in a register that belongs to the physical processor. When the guest virtual machine owns the control flag, a write of the control flag by the guest virtual machine is not redirected. Therefore the write is to a physical register that is not part of the guest virtual machine context. When the guest virtual machine does not own the control flag, the write of the control flag is redirected to the shadow location which is in the guest virtual machine context. Two possible locations are recited where the control flag may be written by the guest virtual machine. One location is the physical register and the other location is the shadow location in the guest virtual machine context.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 1-24 under 35 U.S.C. § 112, second paragraph.

***Rejection Under 35 U.S.C. § 102***

9. Claims 1, 12, 17 are rejected by the Examiner under 35 U.S.C. 102(c) as being anticipated by Bennett et al, Pub No. US 2004/0117532 (hereafter Bennett).
10. **As per claims 1, 12, 17**, the Examiner asserts that Bennett teaches a method for writing a control flag, the method comprising: determining whether the control flag is owned by a guest virtual machine (Abstract; Para 26); writing the control flag to a processor control register if the

control flag is owned by the guest virtual machine (Para 28: wherever the interrupt got delivered to in the guest software corresponds to the control register owned by the guest virtual machine); and writing the control flag to a shadow location if the control flag is not owned by the guest virtual machine (Para 48: wherever the interrupt gets delivered to in the VMM corresponds to the shadow location ).

Applicant respectfully disagrees that Bennett anticipates the claims by disclosing each and every element of the claims. In the abstract and paragraph [0026] Bennett discloses that an interrupt control indicator determines whether or not an interrupt is to be managed by guest software. The interrupt control indicator disclosed by Bennett is entirely unlike the claimed control flag because, as disclosed in paragraph [0023], "The interrupt control indicator(s) cannot typically be accessed and/or modified by the VMs." In great contrast, the claimed control flag may be owned by a guest virtual machine. In paragraph [0028] Bennett discloses that the interrupt will be delivered to the guest software if the currently executing software is ready to receive interrupts. In paragraph [0045] Bennett discloses that the interrupt will be delivered to the virtual machine monitor (VMM) if the VMM is ready to receive interrupts. Receiving an interrupt is entirely unlike writing a control flag because the guest virtual machine does not write a flag value when receiving an interrupt regardless of whether the interrupt is delivered to the guest software or to the VMM.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 1, 12 and 17 under 35 U.S.C. § 102(b) as being anticipated by Bennett, et al. (2004/0117532).

11. Claims 1, 6, 7, 12, and 17 are rejected by the Examiner under 35 U.S.C. 102(e) as being anticipated by Donovan et al., Patent No. 7,251,815 (hereafter Donovan).

12. **As per claims 1, 12, and 17**, the Examiner asserts that Donovan teaches a method for writing a control flag, the method comprising: determining whether the control flag is owned by a guest virtual machine (Column 5, line 65-Column 6, line 2); writing the control flag to a processor control register if the control flag is owned by the guest virtual machine (Column 5, lines 43-46; Column 5, line 65-Column 6, line 2); and writing the control flag to a shadow location if the control flag is not owned by the guest virtual machine (Column 5, lines 35-41: the shared work queue corresponds to the shadow location).

Applicant respectfully disagrees that Donovan anticipates the claims by disclosing each and every element of the claims. Donovan discloses work queues that are located in shared memory that can be directly accessed by each virtual machine hosted by processor (column 4, lines 46-55). Thus the shared work queues are entirely unlike the claimed shadow location that is in a guest virtual machine context accessible only to the guest virtual machine. Donovan further discloses that a virtual machine may assign work items to various virtual machines by assigning each work item to one of the shared work queues associated with a particular virtual machine (column 5, line 59-column 6, line 2). Assigning a work item to a shared queue is entirely unlike writing a control flag to either a processor control register or a shadow location because neither location is shared amongst several virtual machines.

13. **As per claim 6**, the Examiner asserts that Donovan teaches a method for reading a control flag, the method comprising: determining whether the control flag is maintained in a shadow location; reading the control flag from the shadow location if the control flag is maintained in the shadow location; and reading the control flag from a processor control register if the control flag is not maintained in the shadow location (Column 6, lines 20-30: fetching

work from either the semi-dedicated work queue or the shared work queue corresponds to reading from either the processor control register or the shadow location respectively).

Applicant respectfully disagrees that Donovan anticipates the claim by disclosing each and every element of the claim. Donovan discloses work queues that are located in shared memory that can be directly accessed by each virtual machine hosted by processor (column 4, lines 46-55). Donovan refers to the work queues as "semi-dedicated" if only the scheduler in the respective virtual machine removes work items from a work queue but any of the virtual machines can add work items to a work queue (column 4, lines 55-66). Donovan refers to the work queues as "shared" if more than one virtual machine is permitted to remove work items from the work queue (column 7, lines 15-20). A work queue, whether semi-dedicated or shared, is entirely unlike either a processor control register or a shadow location because neither location is shared amongst several virtual machines as a work queue is.

14. **As per claim 7**, the Examiner asserts that the method of claim 6, wherein determining whether the control flag is maintained in a shadow location further comprises determining whether the control flag is owned by the guest virtual machine (Column 5, line 65-Column 6, line 2).

Applicant respectfully disagrees that Donovan anticipates the claim by disclosing each and every element of the claim. Donovan discloses that a work item may be assigned to a particular virtual machine based on a special ability of that virtual machine to handle the assigned work item rather than being assigned based on load balancing considerations (column 5, line 59-column 6, line 2). Assigning a work item to a work queue is entirely unlike the claimed determining whether the control flag is owned by the guest virtual machine.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 1, 6, 7, 12, and 17 under 35 U.S.C. § 102(b) as being anticipated by Bennett, et al. (2004/0117532).

***Rejection Under 35 U.S.C. § 103***

16. Claims 2, 8, 9, 13, 18, 22 are rejected by the Examiner under 35 U.S.C. 103(a) as being unpatentable over Donovan et al., Patent No. 7,251,815 (hereafter Donovan) in view of Khalil et al., Patent No. 7,218,634 (hereafter Khalil).

17. **As per claims 2 ,8, 9, 13, 18, and 22**, the Examiner asserts that Donovan teaches a processor comprising: a processor control register to include a control flag (Column 5, lines 27-31); a pointer to a guest virtual machine context (Column 4, lines 22-25); determining whether the control flag is owned by a guest virtual machine associated with the guest virtual machine context (Column 5, line 65-Column 6, line 3); a shadow location in the guest virtual machine context (Column 5, line 41); an execution control unit to cause a write of the control flag by the guest virtual machine to be redirected to the shadow location if the control flag is not owned by the guest virtual machine (Column 5, lines 35-41).

Applicant respectfully disagrees that Donovan discloses the invention substantially as claimed. Donovan discloses a work queue pointer that is within a virtual machine (column 5, lines 27-31). This is entirely unlike the claimed processor control register that is not within a virtual machine. Donovan discloses that a work item may be assigned to a particular virtual machine based on a special ability of that virtual machine to handle the assigned work item rather than being assigned based on load balancing considerations, such as whether a virtual machine is currently idle (column 5, line 59-column 6, line 3). Assigning a work item to a work queue is entirely unlike the claimed determining whether the control flag is owned by the guest virtual machine. Donovan discloses that a Work Queue Assignment Function (WQAF)



determines whether to assign a work item to a semi-dedicated work queue or to a shared work queue (column 5, line 37-41). Assigning a work item to either a semi-dedicated or shared work queue is entirely unlike the claimed writing of the control flag to either a processor control register or a shadow location because the work queues are always in shared memory and writable by all virtual machines while both a control flag in a processor control register and a shadow location are writable by most one virtual machine.

The Examiner admits that Donovan does not specifically teach a first mask word in the guest virtual machine context, the first mask word to include a first flag to indicate whether the flag is owned by the guest virtual machine. However the Examiner asserts that Khalil teaches a method that uses a mask word to determine who the receiver of a message is suppose to go to for the purpose of ensuring correct communication pathway between sender and receiver (Column 7, lines 1-10).

Applicant respectfully disagrees that Khalil discloses testing a flag in a mask word to determine if a control flag in a processor control register is owned by a guest virtual machine. Khalil discloses a number of fields that are found in an IPv4 information packet's IP header. Khalil discloses that some of the fields provide information that can be used to reassemble multiple-packet messages (column 6, line 59-column 7, line 10). This is unlike a flag that identifies whether a control flag in a processor control register is owned by a guest machine because the flag identifies whether or not the guest machine can write the control flag while the fields disclosed by Khalil identify where an information fragment belongs within a multi-packet message.

The Examiner asserts that it would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to modify the teachings of Donovan with a method that

uses a mask word to determine who the receiver of a message is suppose to go to, as taught by Khalil, such that the mask may be used to determine where the flag should go to in this specific case, because it helps to ensure correct communication pathway between sender and receiver.

Applicant respectfully disagrees that it would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to modify Donovan with the disclosures of Khalil. Khalil discloses registration and hand-off procedures for a mobile node in a packet-based communication network. One of ordinary skill attempting to solve the problem of efficiently writing a control flag in a processor control register by a guest virtual machine would not consider packet-based communications techniques as relevant art.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 2, 8, 9, 13, 18, 22 under 35 U.S.C. § 103(a) as being unpatentable over Donovan et al., Patent No. 7,251,815 (hereafter Donovan) in view of Khalil et al., Patent No. 7,218,634 (hereafter Khalil).  
18. Claims 3-4, 14-15, 19-20 are rejected by the Examiner under 35 U.S.C. 103(a) as being unpatentable over Donovan et al., Patent No. 7,251,815 (hereafter Donovan) in view of Bugnion et al., Patent No. 6,944,699 (hereafter Bugnion).

19. **As per claims 3, 14, 19**, the Examiner asserts that Donovan teaches determining whether the control flag is maintained in the shadow location; writing the control flag to the shadow location if the control flag is not owned by the guest virtual machine and is maintained in the shadow location (Column 5, line 65-Column 6, line 3); the Examiner admits that Donovan does not specifically teach exiting to a virtual machine monitor if the control flag is not owned by the guest virtual machine and is not maintained in the shadow location.

However the Examiner asserts that Bugnion teaches exiting to a virtual machine monitor if the control flag is not owned by the guest virtual machine for the purpose of letting the VMM handle flags that the guest virtual machine cannot handle (Column 6, lines 25-37).

Applicant respectfully disagrees that Donovan discloses the invention substantially is claimed as discussed above. Applicant respectfully disagrees further that Bugnion discloses exiting to a virtual machine monitor if the control flag is not owned by the guest for the machine. Bugnion discloses that a virtual machine never accesses the privilege state of the processor regardless of the setting of a processor (column 6 line 34-36). Thus Bugnion teaches away from providing a shadow location for the control flag so that the virtual machine can complete a write of the control flag without exiting to the virtual machine monitor.

20. **As per claims 4, 15, 20**, the Examiner asserts that Donovan teaches wherein determining whether the control flag is maintained in a shadow location is performed only if the control flag is not owned by the guest virtual machine (Column 5, line 65-Column 6, line 3).

Donovan discloses that a work item may be assigned to a particular virtual machine based on a special ability of that virtual machine to handle the assigned work item rather than being assigned based on load balancing considerations, such as whether a virtual machine is currently idle (column 5, line 59-column 6, line 3). Assigning a work item to a work queue is entirely unlike the claimed determining whether the control flag is owned by the guest virtual machine. Donovan discloses that a Work Queue Assignment Function (WQAF) determines whether to assign a work item to a semi-dedicated work queue or to a shared work queue (column 5, line 37-41). Assigning a work item to either a semi-dedicated or shared work queue is entirely unlike the claimed writing of the control flag to either a processor control register or a shadow location because the work queues are always in shared memory and writable by all virtual machines

while both a control flag in a processor control register and a shadow location are writable by most one virtual machine.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 3-4, 14-15, 19-20 under 35 U.S.C. § 103(a) as being unpatentable over Donovan et al., Patent No. 7,251,815 (hereafter Donovan) in view of Bugnion et al., Patent No. 6,944,699 (hereafter Bugnion).

21. Claims 5, 10, 16, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donovan et al., Patent No. 7,251,815 (hereafter Donovan) in view of Khalil et al., Patent No. 7,218,634 (hereafter Khalil) in view of Bugnion et al., Patent No. 6,944,699 (hereafter Bugnion).

22. **As per claims 10, 23**, the Examiner admits that Donovan in view of Khalil does not specifically teach an exit to a virtual machine monitor if the control flag is not owned by the guest virtual machine and is not maintained in the shadow location.

However, the Examiner asserts that Bugnion teaches exiting to a virtual machine monitor if the control flag is not owned by the guest virtual machine for the purpose of letting the VMM handle flags that the guest virtual machine cannot handle (Column 6, lines 25-37).

Applicant respectfully disagrees that Bugnion discloses exiting to a virtual machine monitor if the control flag is not owned by the guest for the machine. Bugnion discloses that a virtual machine never accesses the privilege state of the processor regardless of the setting of a processor (column 6 line 34-36). Thus Bugnion teaches away from the claimed conditional exit to the virtual machine monitor.

23. **As per claims 5, 11, 16, 21, 24**, the Examiner asserts that Khalil teaches using different flags to indicate who the proper receiver of a message should be (Column 7, lines 1-10).

Applicant respectfully disagrees that Khalil discloses testing a flag to determine if a control flag is maintained in a shadow location. Khalil discloses a number of fields that are found in an IPv4 information packet's IP header. Khalil discloses that some of the fields provide information that can be used to reassemble multiple-packet messages (column 6, line 59-column 7, line 10). This is unlike a flag that identifies whether a control flag in a processor control register is maintained in a shadow location because the flag identifies whether or not the guest machine can write the control flag while the fields disclosed by Khalil identify where an information fragment belongs within a multi-packet message.

The Examiner asserts that it would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to modify the teachings of Donovan with a method that uses a mask word to determine who the receiver of a message is suppose to go to, as taught by Khalil, such that the mask may be used to determine where the flag should go to in this specific case, because it helps to ensure correct communication pathway between sender and receiver.

The Examiner as asserts that it would have been obvious to one having ordinary skill in the art to use as many flags as needed according to the number of different receivers such that a system can properly use these flags to determine where the message should go to such that wherein the execution control unit is responsive to the second flag only if the first flag indicates that the control flag is not owned by the guest virtual machine, because this allows for proper communication between entities.

Applicant respectfully disagrees that it would have been obvious to one having ordinary skill in the art at the time of the applicant's invention to apply the disclosures of Khalil. Khalil discloses registration and hand-off procedures for a mobile node in a packet-based communication network. One of ordinary skill attempting to solve the problem of efficiently

writing a control flag in a processor control register by a guest virtual machine would not consider packet-based communications techniques as relevant art.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 5, 10, 16, 21, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Donovan et al., Patent No. 7,251,815 (hereafter Donovan) in view of Khalil et al., Patent No. 7,218,634 (hereafter Khalil) in view of Bugnion et al., Patent No. 6,944,699 (hereafter Bugnion).

***Conclusion***

Applicant reserves all rights with respect to the applicability of the doctrine of equivalents. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,  
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